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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JIAN QIN, XIAOMIN ZHANG, SRIDHAR RANGANATHAN, and YONG LI

Appeal 2009-008377
Application 10/810,977
Technology Center 3700

Decided: May 5, 2010

Before: WILLIAM F. PATE III, JENNIFER D. BAHR, and JOHN C. KERINS, *Administrative Patent Judges*.

PATE III, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 (2002) from a rejection of claims 22-36. App. Br. 1. We have jurisdiction under 35 U.S.C. § 6(b) (2008).

The claims are directed to permanently wettable superabsorbents. Claim 22, reproduced below, is illustrative of the claimed subject matter:

> 22. A permanently wettable superabsorbent material comprising:
> a superabsorbent material; and
> a surfactant;
> wherein the superabsorbent material has a hydrophobic surface;
> wherein the surfactant has at least one reactive functional group that is reactive with the superabsorbent material;
> wherein the surfactant has at least one non-reactive functional group that is non-reactive with the superabsorbent material;
> wherein the surfactant has been applied to the superabsorbent material as a surfactant solution; and
> wherein the surfactant solution includes an amount of water that is sufficient to activate the hydrophobic surface of the superabsorbent material to promote reaction between the at least one reactive functional group and the hydrophobic surface of the superabsorbent material, but less than sufficient to cause significant swelling of the superabsorbent material.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Bashaw	3,989,586	Nov. 2, 1976
Howe	5,494,611	Feb. 27, 1996
Paul	6,217,890 B1	Apr. 17, 2001

REJECTIONS

Claims 22-27, 29-32, 34 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bashaw and Howe. Ans. 4.

Claims 28, 33, and 36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bashaw, Howe, and Paul[1]. Ans. 6.

ISSUES

Appellants argue claims 22-27, 29-32, 34 and 35 as a group. App. Br. 6-12. We select claim 22 as the representative claim, and claims 23-27, 29-32, 34 and 35 will stand or fall with claim 22. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2008).

The Examiner contends that practicing the process described by Bashaw, while substituting surfactants known to be interchangeable, as taught by Howe, would yield the subject matter of claim 22. Ans. 4-5. The Examiner acknowledges the differences in the process of making the claimed material as compared to the process of making Bashaw's material, but found that none of these differences would result in a final material that is patentably distinct from Bashaw's final material. Ans. 8. The Examiner concludes that, in light of the similarities in the process of making the claimed subject matter and the process of making Bashaw's final material, if the claimed material is in fact different from Bashaw's final material, it was incumbent on Appellants to furnish objective evidence showing that this was the case. Ans. 9-10. According to the Examiner, the Appellants have not

[1] Claim 39 has been cancelled. App. Br. 1.

provided sufficient evidence to show that the claimed material differs from that of Bashaw as modified by Howe.

Appellants contend that Bashaw is directed to "a sorptive paper product" and not a "superabsorbent material" as claimed. App. Br. 6. Appellants also contend that it is unreasonable to interpret Bashaw's copolymer in its acid form as the claimed "superabsorbent material", because it is not until the copolymer is converted to the salt form that it is highly water-swellable. App. Br. 7-9. Appellants also contend that Bashaw's surfactant does not become permanently attached to the copolymer. App. Br. 8. Appellants further contend that Bashaw provides the surfactant in a solution that is 95 to 99.998 percent by weight water which is not "less than sufficient to cause significant swelling of the superabsorbent material." App. Br. 9. Appellants further contend that due to the manufacturing process, Bashaw's copolymer would likely have a hydrophilic surface as opposed to the claimed "hydrophobic surface." App. Br. 9-10; Reply Br 3. Appellants further contend that the Examiner's proposed combination with Howe is improper because Howe is not related to superabsorbent materials or cellulosic pulp and there would be no reasonable expectation of success in substituting the surfactants as proposed by the Examiner. App. Br. 10-11. Appellants do not dispute any of the Examiner's findings or conclusions related to Paul. Appellants only assert that Paul fails to cure the alleged deficiencies of Bashaw and Howe. App. Br. 12-13. In light of these contentions, the sole issue for our consideration is whether the Examiner erred by rejecting claim 22 as being unpatentable over Bashaw and Howe.

FINDINGS OF FACT

1. Superabsorbent fibers have the potential for better fluid distribution than superabsorbent particles. However, superabsorbent fibers typically do not demonstrate better fluid distribution properties perhaps as a result of hydrophobic surfaces formed during the fiber spinning process. Spec. 3:5-14. Surface wettability of the superabsorbent fibers may be improved by applying a suitable surfactant. However, due to the surfactants used and method of application, surfactants may not permanently stay on the surface of the superabsorbent fiber. Spec. 4:23-27.
2. A "permanently wettable superabsorbent material" is a hydrophilic material that is wettable at least upon repeated washings and normal use. Spec. 3:17-23.
3. A number of superabsorbent fibers can be used in the claimed invention. The term "superabsorbent" refers to a water-swellable, water-insoluble material capable, under the most favorable conditions, of absorbing at least about ten times, desirably about twenty times, and often up to one-thousand times, its weight in water. Spec. 5:25-30.
4. Superabsorbent materials of the present invention may include hydrogel polymers such as ethylene maleic anhydride copolymers. Spec. 6:1-7.
5. Bashaw discloses a process wherein a water-insoluble copolymer of maleic anhydride, which may include ethylene, is incorporated in finely divided or fibrous form in a cellulosic web or molded pulp

product, and thereafter converted to a water-swellable polymeric form. Col. 1, ll. 62-65, col. 3, ll. 49-50.

6. Bashaw provides data on various example materials produced by the disclosed process. Col. 5, l. 11 – col. 7, l. 20. Some materials exhibit an absorbency of up to about eighty times their weight in water. Col. 7, ll. 1-8.
7. Surfactants that may be used for making the claimed invention have a functional group reactive with the superabsorbent fibers and a non-reactive hydrophilic functional group. One suitable surfactant is lauryl dimethylamine oxide. Spec. 6:25 – 7:7.
8. To obtain the desired distribution of the maleic anhydride copolymer in the cellulosic web or molded pulp, Bashaw employs a surfactant to disperse the copolymer in the paper-making furnish or pulp suspension. Col. 2, ll. 1-5. One suitable surfactant described by Bashaw is cetyl dimethylamine oxide. Col. 4, l. 68.
9. When the surfactant of Bashaw is combined with the copolymer, the copolymer is hydrophobic. Col. 4, ll. 38-40.
10. Cetyl dimethylamine oxide (PubChem compound ID number 2022528) and lauryl dimethylamine oxide (PubChem compound ID number 15433) have identical functional groups and differ only in carbon chain length. *See* http://pubchem.ncbi.nlm.nih.gov.
11. Howe is directed to a cleaning composition. Abstract. Howe demonstrates that it is well-known to interchange the surfactants cetyl dimethylamine oxide and lauryl dimethylamine oxide. Col. 4, ll. 48-52.

12. Bashaw employs the surfactant in the amount of from about .002 to about 5 percent by weight of the aqueous fluid in which the copolymer is dispersed prior to incorporation in the pulp furnish or slurry. Col. 4, ll. 42-46.
13. The Specification provides that "[t]he amount of water to be added is important; it should be enough to solvate the surface of the fiber" but "not enough to cause significant swelling of the fiber." Spec. 7: 21-25. A desirable amount of water is from .5 to 30 percent by weight of the total weight of the solvent. Spec. 7:27-28.
14. Bashaw recognizes that it is undesirable to prematurely expose the copolymer to an aqueous medium which would cause swelling of the water-swellable polymer. Col. 2, ll. 56-58.

PRINCIPLES OF LAW

Initially Appellants argue that there is no teaching or suggestion to combine the references. App. Br. 4. This argument is foreclosed by *KSR International, Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), in which the Court rejected the rigid requirement of a teaching or suggestion or motivation to combine known elements in order to show obviousness. *Id.* at 415. The Court noted that an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* at 418.

The Examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. The key to supporting any prima facie conclusion of obviousness under 35 U.S.C. § 103 is the clear

articulation of the reason(s) why the claimed invention would have been obvious. The Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. § 103 should be made explicit. *Id.* at 418. The Federal Circuit stated that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (citations omitted) *cited with approval in KSR*, 550 U.S. at 418.

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 550 U.S. at 416. A prima facie conclusion of obviousness may be supported by a showing that the claims are directed to a process, machine, manufacture, or composition of matter already known in the prior art that is altered by the mere substitution of one element for another known in the field, and such modification yields a predictable result. *See id.* (*citing United States v. Adams*, 383 U.S. 39, 40 (1966)). The Court further stated that:

> [I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

KSR, 550 U.S. at 417. When considering obviousness of a combination of known elements, the operative question is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.*

The determination of the scope and content of the prior art includes determining whether prior art references are "analogous." Whether a

reference in the prior art is "analogous" is a fact question. *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992) (*citing Panduit Corp. v. Dennison Mfg.*, 810 F.2d 1561, 1568 n.9 (Fed. Cir. 1987).

> Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

Id. at 658-59 (*citing In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986); *In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979)). "A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *Id.* at 659.

The PTO applies to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in applicant's specification. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997). Reading a claim in light of the specification, to thereby interpret limitations explicitly recited in the claim, is a quite different thing from reading limitations of the specification into a claim, to thereby narrow the scope of the claim by implicitly adding disclosed limitations which have no express basis in the claim. *In re Prater*, 415 F.2d 1393, 1404-05 (CCPA 1969). Although the claims are interpreted

in light of the specification, limitations from the specification are not read into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

"The patentability of a product does not depend on its method of production." *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) (*citing In re Pilkington*, 411 F.2d 1345, 1348 (CCPA 1969)). "If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *Id.* (*citing In re Marosi*, 710 F.2d 799, 803 (Fed. Cir. 1983); *Johnson & Johnson v. W.L. Gore*, 436 F.Supp. 704, 726 (D. Del. 1977); and *In re Fessmann*, 489 F.2d 742 (CCPA 1974)).

As the CCPA stated in *In re Brown*, 459 F.2d 531, 535 (CCPA 1972):

> In order to be patentable, a product must be novel, useful and unobvious. In our law, this is true whether the product is claimed by describing it, or by listing the process steps used to obtain it. This latter type of claim, usually called a product-by-process claim, does not inherently conflict with the second paragraph of 35 U.S.C. 112. That method of claiming is therefore a perfectly acceptable one so long as the claims particularly point out and distinctly claim the product or genus of products for which protection is sought and satisfy the other requirements of the statute. It must be admitted, however, that the lack of physical description in a product-by-process claim makes determination of the patentability of the claim more difficult, since in spite of the fact that the claim may recite only process limitations, it is the patentability of the product claimed and not of the recited process steps which must be established. We are therefore of the opinion that when the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claimed in a product-by-process claim, a rejection based alternatively on either section 102 or section 103 of the statute is eminently fair and acceptable. As a practical matter, the Patent Office is not equipped to manufacture products by the myriad of processes

> put before it and then obtain prior art products and make physical comparisons therewith.

In effect the USPTO bears a lesser burden of proof in making out a prima facie case of obviousness in a product-by-process situation because of its peculiar nature. *Fessmann*, 489 F.2d at 744.

ANALYSIS

Despite differences in the process of making Bashaw's material and the claimed material, the Examiner reasonably concluded that Bashaw discloses a material which would be either identical or only slightly different from the material described in claim 22. Although reaction sequences and conditions can affect the end product, the Examiner's finding that substantially identical reactants would yield a substantially identical end product is reasonable. Appellants have not submitted any evidence to contradict this finding.

The fact that Bashaw never terms his material a "superabsorbent" does not mean that it is unreasonable to read it as such. Identical language is not required for a prior art structure to meet a claim limitation. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990). The absorptive characteristics of Bashaw's material meet the explicit definition of "superabsorbent" provided in Appellants' Specification. Facts 3 and 6. Bashaw teaches using the same compound, ethylene maleic anhydride copolymers, that Appellants describe as suitable for use as the superabsorbent fiber for manufacturing the claimed material. Facts 4 and 5. Even assuming Appellants' premise, that Bashaw's copolymer in the acid form is not properly read as a "superabsorbent material" is correct, this does not establish that the claimed material is

distinguishable from the final material produced by Bashaw's process wherein it has been converted to the highly water-swellable form. *See* Fact 5. Appellants' argument is premised upon an alleged difference in the manufacturing process of Bashaw. Appellants have not provided sufficient evidence to establish this alleged difference in process results in a structure different from that claimed.

The portions of Bashaw cited by Appellants to conclude that Bashaw's surfactant does not remain attached to the copolymer are not persuasive. Even assuming that it is required by the claim (*contra* Ans. 8), even if some surfactant does not remain permanently attached, thereby causing the behavior Appellants allege is characteristic of detached surfactant, it is more likely than not that some does. Again, since the reactants are very similar, if not identical, to a water-insoluble copolymer of maleic anhydride with cetyl dimethylamine oxide or with lauryl dimethylamine oxide, it is reasonable to conclude the final product would be the same. *See* Facts 4, 5, 7, 8, and 10. The fact that Bashaw applies the surfactant at a different time in the process or for a different purpose, again, does not establish that the claimed material is distinguishable from the material ultimately produced by Bashaw.

Appellants compare the amount of water expressed as a percentage of the total weight of the solvent in the Specification to Bashaw's amount of surfactant expressed as a percentage by total weight of aqueous fluid in which the copolymer is dispersed. *See* Facts 12 and 13. These expressions are not synonymous. The latter does not enable a determination of the relative proportions of water and copolymer used by Bashaw—the relevant quantity for determining whether Bashaw employs a sufficient amount of

water to cause "significant swelling of the superabsorbent material" as Appellants suggest. While this quantity is not specifically discussed by Bashaw, Bashaw recognizes that it is undesirable to prematurely expose the copolymer to an aqueous medium which would cause swelling of the water-swellable polymer. Fact 14. One of ordinary skill in the art would have understood this instruction of Bashaw to avoid premature swelling as a teaching to use an amount of water that is "less than sufficient to cause significant swelling of the superabsorbent material." Furthermore, this limitation relates to how the surfactant is applied—a step in the manufacturing process. A claim directed to a material must distinguish from the prior art by the structure of the material itself and not the process by which it is made.

Appellants' arguments regarding the alleged lack of a "hydrophobic" surface of Bashaw's copolymer in acid form directly contradict Bashaw's discussion of the properties of that copolymer. Fact 9. Like Appellants' superabsorbent, the copolymer of Bashaw may be manufactured in fibrous form and would therefore presumably exhibit the same hydrophobic surface characteristics of superabsorbent fibers discussed in the Specification. Facts 1 and 5. Furthermore, the Specification indicates that the hydrophobicity of the surface of the superabsorbent fibers is a problem the present invention seeks to overcome. Fact 1. Once combined with the surfactant, the surface is no longer hydrophobic or its hydrophobicity has been modified. Fact 1. Thus, although recited as a structural element, the hydrophobic nature of the superabsorbent fiber's surface is essentially an initial condition of the process of manufacturing the claimed material. The surface is modified by reaction with the reactive functional group of the surfactant. Thus, read in

light of the Specification, the limitation requiring a "hydrophobic surface" would be understood to mean some modified form of the original hydrophobic surface. Once again, since the constituent reactants are the same, it was reasonable for the Examiner to conclude that the hydrophobic surface of Bashaw's copolymer is modified in same manner by the reaction and therefore results in the same material having a modified hydrophobic surface.

Appellants' arguments regarding the Examiner's combination with Howe are unpersuasive for several reasons. First, although cited to demonstrate that the exact surfactant described in Appellants' preferred embodiment is a known substitute for one of the surfactants disclosed by Bashaw, the claim does not require such specificity. Although the claims are interpreted in light of the Specification, limitations from the Specification are not read into the claims. *In re Van Geuns*, 988 F.2d at 1184. The functional groups of cetyl dimethylamine oxide disclosed by Bashaw are identical to those of lauryl dimethylamine oxide, the substance described in Appellants' preferred embodiment, and would therefore demonstrate similar or identical reactive properties. *See* Fact 10. Thus, Bashaw alone would have rendered the subject matter of claim 22 prima facie obvious.

Secondly, Howe is cited merely to demonstrate that it is well-known to interchange the surfactants cetyl dimethylamine oxide and lauryl dimethylamine oxide. Howe serves as evidence of what one of ordinary skill in the art would understand to be included when Bashaw refers to "suitable surfactants." What a reference teaches or suggests must be examined in the context of the knowledge, skill, and reasoning ability of a

skilled artisan. "What a reference teaches a person of ordinary skill is not . . . limited to what a reference specifically 'talks about' or what is specifically 'mentioned' or 'written' in the reference." *Syntex (U.S.A.) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005). The fact that Howe is directed to manufacturing a cleaning agent rather than an absorbent material does not undermine the teaching for which it is cited. Inventors in the chemical arts understand references are not rendered irrelevant solely based upon the fact that the composition taught is taught to be suitable for a use different from the inventor's anticipated use. Given the similarity of cetyl dimethylamine oxide disclosed and lauryl dimethylamine oxide, there is a reasonable expectation that their substitution will be successful. *See* Fact 10. Absolute predictability that the substitution will be successful is not required; all that is required is a reasonable expectation of success. *See In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988).

Appellants' argument concerning claims 28, 33, and 36[2] is based upon the alleged deficiencies of Bashaw and Howe. App. Br. 12. Since no such deficiencies exist, this argument is unpersuasive.

CONCLUSION OF LAW

The Examiner did not err by rejecting claim 22 as being unpatentable over Bashaw and Howe.

DECISION

For the above reasons, the Examiner's rejections of claims 22-36 are affirmed.

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[2] *See* note 1.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2009).

AFFIRMED

nhl

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